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Bangladesh Population During the First Five-Year Plan Period (1972-77): A Guestimate

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Masihur Rahman Khan

BANGLADESH INSTITUTE OF DEVELOPMENT ECONOMICS
ADAMJEE COURT, MOTIJHEEL COMMERCIAL AREA, DACCA-2
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Bangladesh Institute of Development Economics
Adamjee Court, Motijheel Commercial Area
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For the purposes of planning, allocation of resources, distribution and various other government measures the most commonly used population parameters are its size, growth, geographic distribution and age sex composition. The population census, among other things, provide this kind of data. The last population census in the area that forms Bangladesh was taken on February 1, 1961. However deficient they may be qualitatively, the census materials provide the basic and by far the most comprehensive data for most of the demographic studies in Bangladesh. In recent years, during 1962-65, another set of population data, especially on fertility and mortality of the population, was generated through the Population Growth Estimation (PGE) project in Bangladesh[1/]. Based primarily on the census data and the data on births and deaths produced by the PGE, several demographic studies have been made todate for the population in Bangladesh.

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* The author is the Research Demographer at the Bangladesh Institute of Development Economics, Adamjee Court, Motijheel Commercial Area, Dacca.

1/ The PGE was designed to collect vital rates separately for the then East & West Pakistan.

Previously, before the PGE data were made available, some attempts were made by the demographers to obtain the birth and death rates of the population on the assumption that the population of Bangladesh was closed to external migration and that the age sex data of the population reflected a stable/quasi-stable rate of growth. The results of such investigations met with frustration because the assumptions on which the estimates were based were found faulty.

The primary purpose of the present paper is to assess the quality of the available data and to indicate the possible size the population of Bangladesh will be expected to reach on January 1, 1973 - the middle of the initial year of the Five-Year Plan. The date of the last census conducted in the area being to remote and each component of population change - fertility, mortality and migration - being shrouded with so much uncertainties, any attempt to estimate the current size of the population and projecting it into the future (though for a short period only) has to be based on subjective judgement on some of the major issues. One major uncertain element in the present case seems to be the extent of international migration across the borders of Bangladesh in recent years. We will first discuss the initial population as on February 1, 1961 in relation to the population enumerated in the earlier censuses and then each component of population change - fertility, mortality and migration. The population growth rate will be discussed on a separate heading.

1. Base Population

The 1961 census undertaken by the then Government of Pakistan provides the latest census of population in Bangladesh and is chosen as the base population(subject to some adjustment in the age sex composition and the overall size of the population)[2/] for the purpose of projection. In order to be able to appreciate the recent growth rate, it is necessary to give a historical background of the size and growth of the population of Bangladesh. The first census of Bangladesh under the undivided India was taken in 1871-72, the second census in 1881 and thereafter in about every ten years, the last census under the then Pakistan being taken, as already mentioned, on February 1, 1961. The quality of census was reasonably good, subject to the specific problem encountered in 1941[3/]. In that year, members of the Hindu and Muslim religions vied with each other to report inflated number for political purpose. It is estimated that the inflated size of population due to this factor in Bangladesh was 1.3 million[4/]. The population of Bangladesh

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2/ For details see Lee L. Bean, M. R. Khan and A. R. Rukanuddin, Population Projections for Pakistan, 1960-2000, Karachi : Pakistan Institute of Development Economics, 1968, pp.7-12 and Table A-2.

3/ Masihur Rahman Khan, Migration Within And Across the Boundaries of East and West Pakistan, 1901-61, A thesis presented for the degree of Ph.D. in the Australian National University, Canberra, 1972, pp.41-54.

4/ Ibid, p.38.

enumerated at each census 1901-61 (after adjustments for the inflation in 1941) are shown in Col.(2) of Table 1. Table 1 is also drawn to show the expected population at each census without the direct effect of net external migration (Col.(6)) and that without the external migration and extra deaths from the 1918-19 influenza epidemic and 1943 Bengal famine (Col.(8)). The geometric rates of population growth per year for each set of population are also shown. As can be noted from the table, according to the observed census court, the population of Bangladesh increased by 76% from 28.9 million in 1901 to 50.9 million in 1961. The population increase was slow initially, so that only about 7 million persons were added during the first thirty years 1901-31. During the next thirty years 1931-61, the increment in the population size was 15 million. Without the 1943 Bengal famine and the net external emigration, the population increase during this period would have been much higher.

The adjusted 1961 census population in five-year age group and sex is shown in Table 2. The adjusted 1961 census population (the base population) is 2.6 million higher than observed 1961 census population, and has a more even sex ratio of 105.4 instead of 107.6 enumerated in the census. The basic characteristic features of the base population are (1) a very high proportion of persons (49.9%) under age 15 indicating a very high fertility of the population and a possible substantial improvement in the infant and child mortality in recent years;

Table 1. Population of Bangladesh, 1901-61 and Their Growth Rates

(number in 000's)

Census date	Comparable census population size	Comparable census population growth rate 4/	Intercensal net external migration 1/	Extra deaths	Expected population without net external migration size (2)-(4)	Expected population without net external migration growth rate 4/	Expected population without net external migration and extra deaths size (6)+(5)	Expected population without net external migration and extra deaths growth rate 4/
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1-3-1901	28,928	-	-	-	28,928	-	28,928	-
10-3-1911	31,555	0.87%	+174	-	31,381	0.82%	31,381	0.82%
18-3-1921	33,254	0.52	-106	393 2/	33,361	0.56	33,753	0.67
26-2-1931	35,604	0.69	-643	-	36,247	0.87	36,247	0.87
1-3-1941	40,651	1.33	-618	-	41,269	1.49	41,269	1.49
1-3-1951	42,063	0.34	-1,892	1,864 3/	43,955	0.91	45,819	1.21
1-2-1961	50,854	1.93	-1,148	-	52,002	2.16	52,002	2.16

1/ Estimates obtained from age data in Masihur Rahman Khan, Migration within and Across the Boundaries of East and West Pakistan, 1901-61, A thesis presented for the degree of Ph.D. in the Australian National University, Canberra, 1972, p. 245.

2/ Deaths from 1918-19 influenza epidemic, ibid., p. 384.

3/ Deaths from the 1943 famine, ibid., p. 384

4/ Geometric yearly rates of growth within each intercensal period.

Table 2. Enumerated and Adjusted 1961 Census Population of Bangladesh

(in 000's)

Age	Male			Female		
	Enumerated 1961 Census	Adjusted 1961 Census	Difference (3) - (2)	Enumerated 1961 Census	Adjusted 1961 Census	Difference (6) - (5)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
All ages	26,349	27,427	1,078	24,491	26,021	1,530
0 - 4	4,580	5,658	1,078	4,684	5,591	907
5 - 9	4,869	4,423	-445	4,661	4,362	-299
10 - 14	2,610	3,056	445	2,037	3,008	971
15 - 19	1,922	1,922	-	1,983	1,875	-108
20 - 24	1,825	1,825	-	1,989	1,748	-241
25 - 29	2,002	2,002	-	1,998	1,873	-126
30 - 34	1,693	1,729	37	1,545	1,581	36
35 - 39	1,558	1,483	-75	1,254	1,327	73
40 - 44	1,254	1,260	6	1,113	1,110	-3
45 - 49	1,016	1,059	43	802	928	127
50 - 54	947	847	-100	801	745	-56
55 - 59	611	717	106	435	628	193
60 - 69	899	990	92	724	856	133
70 - 79	390	381	-9	320	326	7
80 +	174	74	-100	147	63	-84

Source: Lee L. Bean, M. R. Khan and A. R. Rukanuddin, Population Projections for Pakistan, 1960-2000, Karachi: Pakistan Institute of Development Economics, 1968, p. 42.

(2) a deficit in the age group 15-24 possibly as a result of low birth rates during 1943 famine period and dislocation due to the Second World War and the Partition of the sub-continent in 1947.

2. Fertility

The birth registration system being highly defective and inefficient to produce any reliable results, the demographers attempted in the past to obtain birth rates of the population through various demographic techniques on the assumption that the population of Bangladesh was closed to external migration and that there has not been any change in the fertility and mortality patterns (stable population assumption) or fertility remaining unchanged, mortality changed only gradually (quasi-stable population assumption). As indicated before the results of such investigations have been faulty primarily because the population of Bangladesh was not closed to external migration during any intercensal period, especially during the decades of 1941-51 and 1951-61[5/].

In order to fill a vacuum in the most pressing data requirements on the fertility and mortality of the population, a very ambitious project called population Growth Estimation was initiated in 1962 by the then Central Statistical Office

5/ M.R. Khan, Migration Within and Across, ..., ibid., p.245.

of the then Government of Pakistan and the then Pakistan (now Bangladesh) Institute of Development Economics with financial and technical help from the Population Council, New York, U.S.A.[6/]

It was long felt that the birth statistics produced by longitudinal registration (LR) system or by the cross sectional survey (CS) system was generally defective, however carefully each system may be designed. It was argued that if identical areas were chosen for registration and survey, identical questionnaires were designed for each and the data pertained to identical time period, it would be possible to compare the individual cases caught by each with the other and establish those cases which are (1) caught by both LR & CS, (2) caught by LR but missed by CS and (3) caught by CS but missed by LR. If the independence of LR and CS is strictly maintained in data collection and further field investigations are carried out to check the authenticity of items (2) and (3) above a correct estimate of the births or deaths would be given by

$$N = C + N_r + N_e + \frac{N_r \cdot N_e}{C}$$

where N = estimates of all events

C = events caught by both LR & CS

N_r = events caught by LR but missed by CS

N_e = events caught by CS but missed by LR.

6/ Since 1964 the financial responsibility from the Population Council was taken over by the National Center for Health Statistics, U. S. A.

The above formula for estimating a correct measure of births or deaths was first designed by C. Chandrasekar and W. Edwards Deming 7/ and as such called Chandrasekar-Deming (CD) estimates of vital rates. The rationale of the CD estimates was upheld by Ansley J.Coale 8/ and the technique is now being tried in Thailand and Turkey. The technique though sound theoratically depends for its operational success on the efficiency of the field operation, independence of the two systems and the accuracy in matching the events.

7/ C.Chandrasekar and W. Edwards Deming, "On a Method of Estimating Birth and Death Rates and the Extent of Registration", Journal of the American Statistical Association, Vol. 44, No.245, March 1949.

8/ Ansley J.Coale,"The Design of an Experimental Procedure for Obtaining Accurate Vital Statistics", International Population Conference , New York, 1961.

The crude birth and death rates and the consequent rates of population growth for Bangladesh as produced by the PGE for the years 1962 through 1965 are given below:

PGE	1962	1963	1964	1965	Average 1962-1965
Birth rates					
(per 1000 mid-year population)					
Chandrasekar-Deming (CD)	56.8	54.9	49.7	49.2	52.6
Longitudinal Registration (LR)	47.0	47.6	42.9	40.4	44.4
Cross-sectional Survey (CS)	41.7	47.7	43.4	37.5	42.5
Deaths rates					
(per 1000 mid-year population)					
Chandrasekar-Deming (CD)	20.3	18.8	20.8	20.1	20.0
Longitudinal Registration (LR)	16.8	16.0	17.3	15.7	16.4
Cross-sectional Survey (CS)	13.1	14.9	16.6	10.3	13.7
Rates of increase					
(per cent population)					
Chandrasekar-Deming (CD)	3.65	3.61	2.89	2.91	3.26
Longitudinal Registration (LR)	3.02	3.16	2.56	2.47	2.80
Cross-sectional Survey (CS)	2.86	3.28	2.68	2.72	2.88

Source: PGE, Report of the Population Growth Estimation Experiment, Pakistan (now Bangladesh) Institute of Development Economics, Karachi,1968, p.83

PGE, Final Report of the Population Growth Estimation Experiment, Pakistan (now Bangladesh) Institute of Development Economics,Dacca, 1971, pp.147, 163, 174, 177, 180, 184, 189, 194.

The following observations are in order:

(1) The CD set of estimates in any year is higher than that obtained through LR or CS system. On an average, the LR system produces estimates of births and deaths higher than those produced by CS system.

(2) The difference between the alternative estimates is substantial.

(3) The births and deaths from the CS system for the year 1965 are very low and their accuracy is in suspect. The year 1965 was the terminal year of the PGE operation. The year also saw the then Pakistani war with India.

(4) Though apparently there seems to be a marked declining trend in fertility during the period 1962-1965, the decline was not as sharp. Three reasons can be listed: (i) During the first two years of the PGE operation (1962 and 1963), the project under the supervision and control of its pioneer Dr.Karol J.Krotki produced reliable results both from the LR and CS systems. But as the non-matched events for these two years were not adequately checked in the field, the CD estimates could have been spurious. (ii) During the last two years of the operation (1964 and 1965) both the LR and CS system suffered from the lack of administrative control ; the quality of the field work deteriorated. But unlike for the first two years, the non-matched events for the years

1964 and 1965 were checked in the field by senior staff, making the CD estimate more reliable. (iii) Part of the apparent decline in the crude birth rate in the years 1964 and 1965 is due to a dent in the Bangladesh age distribution - a relative shortage of persons in the most reproductive ages.

(5) PGE data are subject to sampling and non-sampling errors. Sampling errors can be reduced by combining the estimates for all the four years. The non-sampling errors of the nature described in (4) can vitiate the result of a particular year but would tend to cancel out somewhat in the combined data for 1962-1965. Because of the rigidity of the matching operation maintained in the PGE, the CD set of estimate would be somewhat spurious and can be considered as the upper limit of the fertility or mortality estimate. As the non-matched events were subjected to field investigations to check their authenticity and the individual events that did not properly belong to the either were discarded, the events caught either in LR or CS were genuine. The higher of the two estimates can thus be considered as the lower limit of the births or deaths. We can thus maintain that,on the average, during 1962-1965 the birth rate of Bangladesh ranged between 44.4 and 52.6 per thousand population; while the death rate between 16.4 and 20.0 per thousand. The correct rate will be closer to the upper limit. Thus we can possibly maintain that during the period 1962-1965

the birth rate in Bangladesh was around 50.0 per thousand, death rate around 18.5 per thousand, and the rate of population growth around 3.15%.

The fertility of our population is very high - much higher than that of India. Muslim population in the sub-continent had always experienced a higher fertility than the non-Muslims. Fertility in Bangladesh is even higher than that in Pakistan. Besides religion, high illiteracy, low urbanization and a very high proportion of the traditional agricultural population are possibly some of the major reasons for high fertility. High fertility connotes a high dependency ratio per working age population, encourages consumption rather than savings and retards capital formation. Only a deliberate and vigorous effort launched by the government and the private agencies can curb the high fertility spree to a desired level.

3. Mortality

Like the registration of birth, the registration of death of the population has always been poor. The census actuaries in India , instead of registered deaths, used the census age distribution, supplemented at times with some detailed age sex tabulations especially collected for the purpose, to construct intercensal life tables. The estimation of death rate by the demographers

has mostly been the residual of the growth rate of the population from the estimated birth rate, and as such results have not always been encouraging, especially when the area for which estimates were made, like Bangladesh, was subjected to considerable net external migration.

The expectation of life at birth for Bangladesh was very low at around 21.5 years in 1901-11, rose only slowly by around 1.6 point per decade to 28.1 in 1941-51 and rose very fast by over 10 points during the one decade to 38.4 in 1951-61[9/]. The expectation of life at birth in 1962-1965 from CD set of PGE estimate was 45.7 years. The rapid improvement in the mortality in recent years was made possible through the use of antibiotics and application of cheap public health measures in controlling epidemics like cholera, typhoid, small pox and limiting the incidence of malaria. The mortality in Bangladesh is still high and there is much scope for improving the general mortality, infant mortality and maternal mortality around the early period of child-bearing.

9/ These estimates are made without taking into account of extra deaths from 1918-19 influenza epidemic and 1943 famine in Bangladesh. For the detailed life table values and derivation see M. R. Khan, Migration Within and Across .... , op. cit., Appendix - B.

In all probability the death rate of the population will show a monotonic decline[10/] until it reaches to possibly 7-8 per thousand by around the end of the present century.

4. Migration

Migration played an important role in the growth of the Bangladesh population. With the exception of 1901-11 decade when Bangladesh gained around half a million persons as a result of net immigration from India, Bangladesh was losing population through net emigration mainly to India in all other decades. From an initial low net emigration figure of around 100 thousand in 1911-21, the net emigration rose to over 600 thousand in each of the decades of 1921-31 and 1931-41, to 1.9 million in 1941-51 and around 1.2 million in 1951-61 (see Table 1). Though no estimate of net migration could be made for the period after the 1961 census, it can be argued that Bangladesh was expected to lose population to India even after that date. The exodus was possibly high in 1964-66 due to and associated with the Pakistani war in 1965 with India. Concerning the more recent migration, it is officially maintained that the exodus of around 10 million Bangalees to India from the then East Pakistan when she was still in the hands of Pakistan army was balanced out by a reverse migration of that magnitude to their motherland after the liberation of Bangladesh. In the post-liberation period there has been some inflow of Bengalees from across

10/ Excluding of course, any unnatural deaths from cyclone, war etc

the border of India only possibly for short stay as visitors. Given the present still unsettled socio-economic condition of the country, the possibility of a continued net emigration flow from Bangladesh, though a smaller magnitude compared to that in 1940s or 1950s, cannot be ruled out.

5. Rates of Growth

The rate of population growth is the balance between fertility, mortality and migration. The birth rate minus death rate gives the nutural rate of population growth. Generally speaking, the natural rate of population growth in the past, until a couple of centuries or so, was very slow, at times negative, because a high birth rate (more or less constant) was matched by almost equally high (often fluctuating) death rate. Coming to the more recent period, the natural rate of population growth in Bangladesh was small during the decades 1901-11, 1911-21, 1921-31 and 1941-51, moderately high in 1931-41 and high in 1951-61 (see Table 1). This pattern contrasts somewhat from that observed in the sub-continent of Bangladesh, India and Pakistan as a whole, because the incidences of the 1918-19 influenza death was lower and the 1943 famine deaths much higher in Bangladesh, compared to the rest of the sub-continent.

The rate of the natural growth of the population in Bangladesh in 1951-61 was 2.2 per cent per annum with net emigration the rate of growth was 1.9% per annum.

Since 1943 Bengal famine, there has been a monotonic improvement in the mortality of the population, while fertility remained more or less unchanged at a high level. This resulted in an accelerated natural rate of population growth. Compared to the decline in mortality a model pattern of fertility change is that with a time lag of a number of years (the length of the time lag depending on the relative success of the family planning efforts of the people and the government) fertility start declining, though slowly initially and then quite fast. This simple pattern of fertility change is vitiated somewhat because of the dent in our age distribution as mentioned above. Even if we assume that our population have shown signs of declining fertility in recent years, the population growth rate will not decline during the plan period from its pre-plan period level.

Calculation of the Expected Population Size on January 1, 1973

With the adjusted 1961 census population as the base and with the following assumption of the birth and death rates, the population of Bangladesh on July 1,1970 should have reached to

	Birth rate	Death rate
July 1,1960 - June 30,1965	49.5	18.0
July 1,1965 - June 30,1970	47.7	14.4

around 72.4 million[11]. With a 3.3% rate of population growth per annum this population would have reached to 73.6 million on January 1, 1971. An assumed half a million deaths due to December 1970 cyclone would have brought the total size down to 73.1 million on January 1, 1971. An assumed yearly rate of growth of 3.3% (without extra mortality) and an assumed extra deaths of three million due to the direct and indirect effect of the Pakistani army creckdown in Bangladesh during the occupation period of March 25 to December 16,1971 would have brought the population size down to 72.5 million on January 1,1972. At the assumed rate of growth, this population would rise to 74.9 million on January 1, 1973. The above calculations have been made without taking into account of the external migration. If it is assumed that the net emigration from Bangladesh during February 1, 1961 to January 1, 1973 would be around one million, the actual size of the Bangladesh population on January 1,1973 would be around 73.9 million persons[12]. For the rest of the plan period a yearly rate of population growth of over 3% can be reasonably assumed. At merely 3% rate of increase,

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11/ Obtained by interpolation from Lee L. Bean, M. R. Khan and A.R. Rukanuddin, Population Projections for Pakistan, 1960-2000, Karachi: Pakistan (now Bangladesh) Institute of Development Economics,1968.

12/ In view of the uncertainties associated with the compenents of population change, it would be safe to assume that, at 95% confidence level, the population size of Bangladesh on January 1, 1973 will range between 73.9 ± 1.5 million.

73.9 million population on January 1,1973 will rise to 76.1 million on January 1, 1974; 78.4 million on January 1,1975; 80.8 million on January 1, 1976; 83.2 million on January 1,1977 and 85.7 million on January 1,1978.

Discussion

It should be noted that projecting population by using growth rate is a rather crude method. The liberty is taken here in view of the urgency of the population data requirements by the government agencies. A reasonable age sex distribution of the estimated total population, if desired, can be obtained through interpolation of the available population projections[13/] and on assumed age sex pattern of the net external migration and of the extra mortality due to cyclone and Pakistani army crackdown in recent years.

Given a very high fertility and a low and declining mortality, the high rate of population growth in Bangladesh is not surprising. According to the latest estimates available, a large number of developing countries are now experiencing a rate of population

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13/ Lee L. Been et. al., op. cit.

growth over 3% per annum[14]. According to the 1971 provisional census population figure in India, the yearly average rate of population growth during the 1961-71 intercensal period increased to 2.21%[15] from a corresponding observed growth of 1.98% in the previous intercensal period 1951-61. Given an increasing trend in the rate of population growth, the average yearly rate of 2.21% for decade 1961-71 underestimates the actual rate the population was experiencing around the end of the intercensal period. Furthermore, the Indian rate of population growth would be much smaller than that of Bangladesh because of difference in the level of fertility in the two countries. Unlike Bangladesh, not only the initial level of fertility was much lower, India has made a substantial success in its family planning efforts. In Bangladesh, a very dedicated and vigorous family planning efforts, undertaken on a national priority and emergency basis, are necessary preconditions for curbing the high rate of population growth and its consequent economic and social evils, in a tolerably short period.

14/ The countries include Algeria(3.4%), Ghana (3.0%),Kenya (3.0%), Morocco (3.0%), Rhodesia(3.1%), Sudan(3.3%), Brazil (3.1%),Columbia (3.2%),Dominican Republic(3.3%), Ecuador(3.4%), El Salvador (3.3%), Honduras (3.0-3.5%), Jamaica (3.0%), Maxico(3.5%), Nicaragua (3.5%) Panama(3.2%), Peru (3.1%), Venezuela (3.7%), Iran (3.1%), Jordan (3.1%), Malaysia(3.0%), Philippines (3.5%), Thailand (3.2%), Vietnam (3.1%). Summarised in Report on Population/Family Planning, July 1970,No.2 (1970 Edition) Issued by the Population Council and The International Institute for the study of Human Reproduction, Columbia University.

15/ Though affected by migration, the corresponding growth rates in West Bengal and Assam were 2.42% and 2.96% respectively.